What we claim is:

1.   A management computer connected through a second
network to data storage apparatuses that are connected to
computers through a first network, said management computer
comprising:

     a storage area information collecting module which collects
respective pieces of storage area information from said data
storage apparatuses connected through the second network,
wherein each piece of storage area information relates to storage
areas provided by a data storage apparatus concerned;

     a hierarchy information collecting module which collects
respective pieces of hierarchy information from said data storage
apparatuses connected through said second network, wherein each
piece of hierarchy information indicates hierarchy among data
storage apparatuses held by a data storage apparatus concerned;
and

     a management relation information creation module which
sets hierarchy among said data storage apparatuses to create
management relation information, based on said pieces of storage
area information and said pieces of hierarchy information
collected in said storage area information collecting module and
said hierarchy information collecting module.

2.   A management computer according to Claim 1, wherein:
     said management computer further comprises:
     a management information creation module that

4   recognizes a number of data storage apparatuses according to a
5   number of said pieces of storage area information collected in said
6   storage area information collecting module and prepares pieces of
7   management information used respectively for managing said
8   data storage apparatuses, wherein a number of said pieces is
9   equal to a recognized number of data storage apparatuses; and

10   said management relation information creation module
11   associates each of said data storage apparatuses with a piece of
12   management information used for managing the data storage
13   apparatus in question, and adds information indicating the
14   association to said management relation information.

1   3.   A management computer according to Claim 1, further
2   comprising:
3   a screen data creation module which creates hierarchy
4   display screen data that is used for displaying said data storage
5   apparatuses on a screen according to the hierarchy set in said
6   management relation information creation module; and
7   a screen data sending module which sends said hierarchy
8   display screen data created in said screen data creation module to
9   an output device connected to the management computer itself.

1   4.   A management computer according to Claim 3, wherein:
2   said screen data creation module creates pieces of data
3   storage apparatus display data for respectively specifying said
4   data storage apparatuses in said hierarchy display screen data,
5   and adds pieces of information identifying those pieces of data
6   storage apparatus display data to said management relation

7 information to hold those pieces of information in said
8 management relation information.

1 5. A management computer according to Claim 4, further
2 comprising:
3 a management module choosing module that refers to said
4 management relation information to extract a piece of
5 management information corresponding to a certain piece of data
6 storage apparatus display data that is chosen when an instruction
7 to choice said certain piece of data storage apparatus display data
8 is received from said output device, and sends the extracted piece
9 of management information to said output device.

1 6. A management computer according to Claim 4, further
2 comprising:
3 a warning message creation module that:
4 refers to said management relation information when an
5 instruction to choice a certain piece of data storage apparatus
6 display data is received from said output device, to extract a data
7 storage apparatus held in said management relation information
8 being associated with the chosen piece of data storage apparatus
9 display data;
10 judges whether the extracted data storage apparatus is a
11 data storage apparatus (a first type data storage apparatus)
12 providing a storage area for storing data used by a computer or a
13 data storage apparatus (a second type data storage apparatus)
14 providing a storage area for storing data used by a computer
15 through said first type data storage apparatus; and

16   when the extracted data storage apparatus is judged to be
17   said second type of data storage apparatus, creates a warning
18   message to send the created warning message to said output
19   device.

1   7.   A management computer according to Claim 3, further
2   comprising:
3   a notification modification module that:
4   refers to said management relation information to judge
5   whether a data storage apparatus as a source of a status change
6   notification is a data storage apparatus (a first type data storage
7   apparatus) providing a storage area for storing data used by a
8   computer or a data storage apparatus (a second type data storage
9   apparatus) providing a storage area for storing data used by a
10   computer through said first type data storage apparatus, when
11   said status change notification is received from said data storage
12   apparatus connected to said management computer through said
13   second network; and
14   when said data storage apparatus is judged to be said
15   second type of data storage apparatus, refers to said management
16   relation information to create a new display message by reflecting
17   the hierarchy acquired from said management relation
18   information onto contents of the received notification.

1   8.   A management computer connected through a second
2   network to data storage apparatuses that are connected to
3   computers through a first network, wherein:
4   said management computer comprises an arithmetic unit

5   and a memory; and

6   said arithmetic unit:

7   collects respective pieces of storage area information from
8   said data storage apparatuses connected through said second
9   network, wherein each piece of storage area information relates to
10 storage areas provided by a data storage apparatus concerned;

11   collects respective pieces of hierarchy information from
12 said data storage apparatuses connected through said second
13 network, wherein each piece of hierarchy information indicates
14 hierarchy among data storage apparatuses held by a data storage
15 apparatus concerned:

16   sets hierarchy among said data storage apparatuses to
17 create management relation information, based on said pieces of
18 storage area information and said pieces of hierarchy information,
19 and of storing the created management relation information into
20 said memory; and

21   outputs said management relation information stored in
22 said memory.

1 9.   A management computer according to Claim 8, wherein:
2   said arithmetic unit:

3   further recognizes a number of data storage apparatuses
4 according to a number of said pieces of the collected storage area
5 information and creates pieces of management information for
6 respectively managing data storage apparatuses, wherein a
7 number of said pieces is equal to a recognized number of data
8 storage apparatuses and storing the created pieces of management
9 information into said memory; and

10 associates each of said data storage apparatuses with a
11 piece of management information used for managing the data
12 storage apparatus in question and adds information indicating the
13 association to said management relation information, in said
14 processing of creating said management relation information and
15 storing the created management relation information into said
16 memory.

1 10. A computer program product for a management computer
2 connected through a second network to data storage apparatuses
3 that are connected to computers through a first network, wherein:
4 said computer program product comprises:
5 a code that collects respective pieces of storage area
6 information from said data storage apparatuses connected
7 through said second network, wherein each piece of storage area
8 information relates to storage areas provided by a data storage
9 apparatus concerned;
10 a code that collects respective pieces of hierarchy
11 information from said data storage apparatuses connected
12 through said second network, wherein each piece of hierarchy
13 information indicates hierarchy among data storage apparatuses
14 held by a data storage apparatus concerned;
15 a code that sets hierarchy among said data storage
16 apparatuses to create management relation information, based on
17 the collected pieces of storage area information and the collected
18 pieces of hierarchy information collected;
19 a code that outputs the created management relation
20 information; and

21   a computer readable storage medium for storing the codes.

1   11.   A computer program product according to Claim 10,
2   further comprising:
3   a code that recognizes a number of data storage
4   apparatuses according to a number of said pieces of the collected
5   storage area information,
6   a code that prepares pieces of management information
7   used respectively for managing data storage apparatuses, wherein
8   a number of said pieces is equals to a recognized number of data
9   storage apparatuses; and
10   a code that associates each of said data storage
11   apparatuses with a piece of management information used for
12   managing said data storage apparatus in question, and adds
13   information indicating the association to said management
14   relation information.

1   12.   A computer system comprising:
2   a group of data storage apparatuses including at least one
3   first type data storage apparatus providing a storage area for
4   storing data used by a computer and at least one second type data
5   storage apparatus providing a storage area for storing data used
6   by said computer through a first type data storage apparatus;
7   a management computer that manages said group of data
8   storage apparatuses;
9   a first network connecting between said computer and said
10   group of data storage apparatuses;
11   a second network connecting between said group of data

12   storage apparatuses and said management computer;

13   wherein:

14   said management computer comprises:

15   a storage area information collecting module which collects

16   respective pieces of storage area information from said data

17   storage apparatuses connected through said second network,

18   wherein each piece of storage area information relates to storage

19   areas provided by a data storage apparatus concerned;

20   a hierarchy information collecting module which collects

21   respective pieces of hierarchy information from said data storage

22   apparatuses connected through said second network, wherein each

23   piece of hierarchy information indicates hierarchy among data

24   storage apparatuses held by a data storage apparatus concerned;

25   and

26   a management relation information creation module which

27   sets hierarchy among said data storage apparatuses to create

28   management relation information based on said pieces of storage

29   area information and said pieces of hierarchy information

30   collected in said storage area information collecting module and

31   said hierarchy information collecting module.

1   13.   A data storage apparatus management method in a

2   management computer connected through a second network to

3   data storage apparatuses that are connected to computers through

4   a first network, the method comprising steps of:

5   collecting respective pieces of storage area information

6   from said data storage apparatuses connected through said second

7   network, wherein each piece of storage area information relates to

8   storage areas provided by a data storage apparatus concerned;

9   collecting respective pieces of hierarchy information from

10   said data storage apparatuses connected through said second

11   network, wherein each piece of hierarchy information indicates

12   hierarchy among data storage apparatuses held by a data storage

13   apparatus concerned; and

14   setting hierarchy among said data storage apparatuses to

15   create management relation information, based on said pieces of

16   storage area information and said pieces of hierarchy information.

1   14.   A data storage apparatus management method according

2   to Claim 13, further comprising steps of:

3   recognizing a number of data storage apparatuses

4   according to a number of said pieces of the collected storage area

5   information;

6   preparing pieces of management information for

7   respectively managing data storage apparatuses, wherein a

8   number of said pieces is equal to a recognized number of data

9   storage apparatuses; and

10   associating each of said data storage apparatuses with a

11   piece of management information used for managing the data

12   storage apparatus in question and adding information indicating

13   the association to said management relation information, in

14   creating said management relation information.

1   15.   A data storage apparatus management method according

2   to Claim 13, further comprising steps of:

3   creating hierarchy display screen data that is used for

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4   displaying said data storage apparatuses on a screen according to
5   said management relation information; and
6   sending said created hierarchy display screen data to an
7   output device connected to the management computer itself.

1   16.   A data storage apparatus management method according
2   to Claim 15, further comprising of steps of:
3   creating pieces of data storage apparatus display data for
4   respectively specifying said data storage apparatuses in said
5   hierarchy display screen data, when said hierarchy display screen
6   data is created; and
7   adding pieces of information identifying those pieces of
8   data storage apparatus display data to said management relation
9   information, to hold those pieces of information in said
10   management relation information.

1   17.   A data storage apparatus management method according
2   to Claim 16, further comprising a step of:
3   referring to said management relation information to
4   extract a piece of management information corresponding to a
5   certain piece of data storage apparatus display data that is chosen
6   when an instruction to choice said certain piece of data storage
7   apparatus display data is received from said output device, and
8   sending the extracted piece of management information to said
9   output device.

1   18.   A data storage apparatus management method according
2   to Claim 17, further comprising steps of:

3   referring to said management relation information when
4   an instruction to choice a certain piece of data storage apparatus
5   display data is received from said output device, to extract a data
6   storage apparatus held in said management relation information
7   being associated with the chosen piece of data storage apparatus
8   display data;
9   judging whether the extracted data storage apparatus is a
10   data storage apparatus (a first type data storage apparatus)
11   providing a storage area for storing data used by said computer or
12   a data storage apparatus (a second type data storage apparatus)
13   providing a storage area for storing data used by said computer
14   through said first type data storage apparatus; and
15   creating a warning message to send the created warning
16   message to said output device, when the extracted data storage
17   apparatus is judged to be said second type of data storage
18   apparatus.

1   19.   A management computer according to Claim 2, wherein:
2   said management computer further comprises:
3   a   management   computer   identification   information
4   collecting module which collects respective pieces of management
5   computer identification information from said data storage
6   apparatuses through said second network, wherein each piece of
7   management computer identification information indicates
8   whether a data storage apparatus concerned has been already
9   connected to said management computer; and
10   said management information creation module does not
11   create a piece of management information with respect to a data

12 storage apparatus from which said management computer
13 identification information collecting module has collected a piece
14 of management computer identification information indicating
15 that said management computer is connected to said data storage
16 apparatus.

1   20.   A computer system comprising:
2   a computer;
3   data storage apparatuses;
4   a management computer that manages said data storage
5   apparatuses;
6   a first network connecting between computers and said
7   data storage apparatuses;
8   a second network connecting between said data storage
9   apparatuses and said management computer; and
10   a management console connected to said management
11 computer; wherein:
12   said data storage apparatuses includes:
13   one or more first type data storage apparatuses each
14 providing storage areas for storing data used by said computers;
15 and
16   one or more second type data storage apparatuses each
17 providing storage areas for storing data used by said computers
18 through a storage area of said first type data storage apparatuses;
19   said management computer comprises:
20   a storage area information collecting module which collects
21 respective pieces of storage area information from said data
22 storage apparatuses, wherein each piece of storage area

23 information relates to storage areas provided by a data storage
24 apparatus concerned;

25   a management information creation module that
26 recognizes a number of data storage apparatuses according to a
27 number of said pieces of storage area information collected in said
28 storage area information collecting module and prepares pieces of
29 management information used respectively for managing said
30 data storage apparatuses, wherein a number of said pieces is
31 equal to a recognized number of data storage apparatuses;

32   a hierarchy information collecting module which collects
33 respective pieces of hierarchy information from said data storage
34 apparatuses, wherein each piece of hierarchy information
35 indicates hierarchy among data storage apparatuses held by a
36 data storage apparatus concerned;

37   a management relation information creation module which
38 sets hierarchy among said data storage apparatuses to create
39 management relation information, based on said pieces of storage
40 area information, said pieces of management information and said
41 pieces of hierarchy information collected in said storage area
42 information collecting module, said management information
43 creation module and said hierarchy information collecting module;

44   a screen data creation module that:

45   creates hierarchy display screen data that is used for
46 displaying said data storage apparatuses according to the
47 hierarchy set in said management relation information creation
48 module and pieces of data storage apparatus display data for
49 respectively specifying said data storage apparatuses in said
50 hierarchy display screen data, and

51   adds pieces of information identifying those pieces of data

52   storage apparatus display data to said management relation

53   information;

54   a screen data sending module which sends said hierarchy

55   display screen data created in said screen data creation module

56   and said data storage apparatus display data to said management

57   console;

58   a warning message creation module that:

59   refers to said management relation information when an

60   instruction to choice a certain piece of data storage apparatus

61   display data is received from said management console, to extract

62   a data storage apparatus held in said management relation

63   information being associated with the chosen piece of data storage

64   apparatus display data;

65   judges whether the extracted data storage apparatus is a

66   first type data storage apparatus or a second type data storage

67   apparatus; and

68   when the extracted data storage apparatus is judged to be

69   said second type of data storage apparatus, creates a warning

70   message to send the created warning message to said management

71   console;

72   a management module choosing module that refers to said

73   management relation information to extract a piece of

74   management information corresponding to a certain piece of data

75   storage apparatus display data that is chosen when an instruction

76   to choice said certain piece of data storage apparatus display data

77   is received from said management console, and sends the

78   extracted piece of management information to said management

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79 console;

80   a notification modification module that:

81   refers to said management relation information to judge

82 whether a data storage apparatus as a source of a status change

83 notification is a first type data storage apparatus or a second type

84 data storage apparatus, when said status change notification is

85 received from said data storage apparatus (i.e., said source of the

86 status change notification); and

87   when said data storage apparatus is judge to be said

88 second type of data storage apparatus, refers to said management

89 relation information to create a new display message by reflecting

90 the hierarchy acquired from said management relation

91 information onto contents of the received notification; and

92   a modification notification sending module which sends the

93 display message created in said notification modification module

94 to said management console;

95   said management console comprises:

96   a display module which displays the display data received

97 from said management computer;

98   an instruction receiving module which receives an

99 instruction from an administrator through said display module;

100 and

101   an instruction sending module which sends an instruction

102 received from the administrator through said instruction

103 receiving module to said management computer;

104   said display module comprises a hierarchy display area, a

105 warning message display area and a status change notification

106 information display area;

107   said hierarchy display area displays said hierarchy display

108   screen data and said data storage apparatus display data;

109   said warning message display area displays said warning

110   message; and

111   said status change notification information display area

112   displays the display message received from said modification

113   notification sending module.